

What is claimed is:

1. A method of assembling a semiconductor package, comprising:
  - attaching a protective tape to the active surface of a semiconductor wafer characterized by an initial wafer thickness, the active surface containing a plurality of semiconductor chips separated by scribe lines;
  - sawing the semiconductor wafer along the scribe lines to separate the plurality of semiconductor chips into individual chips, each individual chip being covered by a protective tape portions;
  - attaching an individual chip to a chip pad;
  - decreasing the adhesion between the individual chip and the corresponding protective tape portion; and
  - removing the protective tape portion from the individual chip.
2. The method of assembling a semiconductor package according to claim 1, further comprising:
  - reducing the initial thickness of the semiconductor wafer to reach a final thickness after attaching the protective tape to the active surface.

3. The method of assembling a semiconductor package according to claim 2, wherein the final thickness of the semiconductor wafer is no greater than about 200  $\mu\text{m}$ .

4. The method of assembling a semiconductor package according to claim 1, wherein the chip pad is provided on a leadframe, the leadframe also including outer leads, further comprising:

forming the outer leads to provide external connections to the individual chip.

5. The method of assembling a semiconductor package according to claim 1, wherein the chip pad is provided on a substrate, the substrate also including solder balls to provide external connections to the individual chip.

6. The method of assembling a semiconductor package according to claim 1, wherein decreasing the adhesion of the protective tape further comprises: exposing the protective tape to UV radiation.

7. The method of assembling a semiconductor package according to claim 1, wherein decreasing the adhesion of the protective tape further comprises: heating the protective tape to a temperature above a degradation temperature.

8. The method of assembling a semiconductor package according to claim 1, wherein the protective tape is substantially transparent to visible light.

9. The method of assembling a semiconductor package according to claim 1, wherein the protective tape has a thickness no greater than about 500  $\mu\text{m}$ .

10. The method of assembling a semiconductor package according to claim 9, wherein the ratio of the final thickness of the semiconductor wafer and the thickness of the protective tape is between 1:1 and 1:10.

11. The method of assembling a semiconductor package according to claim 10, wherein the ratio is between 1:1 and 1:3.

12. The method of assembling a semiconductor package according to claim 1, wherein removing the protective tape portion further comprises: extending a transfer device to contact a top surface of the protective tape portion;

applying a vacuum to a portion of the top surface of the protective tape portion to establish a temporary attachment between the protective tape portion and the transfer device; and

retracting transfer device to separate the protective tape portion from the individual chip.

13. The method of assembling a semiconductor package according to claim 1, wherein removing the protective tape portion further comprises;

positioning a release tape adjacent a top surface of the protective tape portion, the release tape;

pressing an adhesive layer provided on the release tape against the top surface of the protective tape portion, causing the protective tape portion to adhere to the release tape; and

increasing a separation distance between the release tape and the individual chip, thereby removing the protective tape portion from the surface of the individual chip.

14. An apparatus for use in assembling a semiconductor package comprising:

chip positioning means for positioning an individual chip, the individual chip including a protected surface having a protective tape portion arrayed thereon;

tape positioning means for positioning a release tape adjacent the protective tape portion; and

tape displacement means for causing the release tape to be attached to the protective tape portion and, once bonded, to separate the protective tape portion from the protected surface of the individual chip.

15. An apparatus for use in assembling a semiconductor package according to claim 14, further comprising:

tape supply means for dispensing the release tape; and  
tape receiving means for receiving the release tape and the protective tape portion bonded thereto.

16. An apparatus for use in assembling a semiconductor package according to claim 15, wherein:

the tape supply means includes a release tape supply roll;  
the chip positioning means includes a conveyor or a holder;  
the tape positioning means includes a guide roller or guide pin;  
the tape displacement means includes a pressure roller or a pressure pin;  
the tape receiving means includes a winding roll.

17. An apparatus for use in assembling a semiconductor package according to claim 16, wherein:

the chip positioning means is arranged and configured to hold a plurality of individual chips mounted on a carrier.

18. An apparatus for use in assembling a semiconductor package according to claim 17, wherein:

the carrier is a frame, a leadframe or a circuit board.

19. An apparatus for use in assembling a semiconductor package comprising:

chip positioning means for positioning an individual chip, the individual chip including a protected surface having a protective tape portion arrayed thereon; and tape removal means for removing the protective tape portion from the protected surface.

20. An apparatus for use in assembling a semiconductor package according to claim 19, wherein:

the chip positioning means includes a conveyor or a holder; and

the tape removal means includes a vacuum device arranged and configured to establish a secure, releasable attachment to an upper surface of the protective tape portion.

21. An apparatus for use in assembling a semiconductor package according to claim 20, wherein:

the chip positioning means is arranged and configured to hold a plurality of individual chips mounted on a carrier.

22. An apparatus for use in assembling a semiconductor package according to claim 21, wherein:

the carrier is a frame, a leadframe or a circuit board.